

## **REMARKS**

### **Status of the Claims**

Upon entry of the amendment above, claims 1-3, 5-10, 12-17, and 19-33 will be pending, claims 1, 7, 10, and 22 being independent.

### **Summary of the Office Action**

Claims 1-3, 5-10, 12-17, and 19-30 are rejected under 35 USC §112, first and second paragraphs.

Claims 1-3, 5, 6, 8-10, 12-17, and 19-30 are rejected under 35 USC §102(b) as being anticipated by KING et al. (U.S. Patent No. 6,018,819, "KING").

Claim 7 is indicated to contain allowable subject matter, but is objected to as being dependent upon a rejected base claim.

### **Response to the Office Action**

Applicants' amendment filed on May 26, 2005 was intended to place the instant application in condition for allowance, consistent with the Examiner's indication of allowable subject matter in the immediately prior Office action.

The instant response is being filed to address new grounds of rejection not necessitated by Applicants' amendment of May 26, 2005.

#### **A. Withdrawal of Premature Final Rejection**

Pursuant to the guidelines presented in the Manual of Patent Examining Procedure (MPEP), Section 706.07(d), Applicants kindly request that the final rejection issued on September 14, 2005 be withdrawn as being premature. Applicants' reasons are as follows.

Page 5, lines 9-12 of the immediately preceding Office action, *i.e.*, the Office action of March 11, 2005, explains that

Claims 4 and 18 [are] objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including the limitations of the base claim and any intervening claims. Claims 4 and 18 claim a hydrophilic treatment, which is not disclosed by the cited references.

In their reply filed on May 26, 2005, Applicants amended independent claims 1 and 10 by incorporating therein the subject matter of allowable claims 4 and 18, respectively.

On page 2 of the final Office action of September 14, 2005, independent claims 1 and 10, *inter alia*, are rejected under 35 USC §112, first paragraph, for failing to comply with the enablement requirement. Specifically, the rejection provides that “[i]n regard to the ‘hydrophilic treatment’ it is not clear as to what the treatment encompasses.”

Further, on page 3 of the final Office action, claims 1 and 10 are rejected under 35 USC §112, second paragraph, based upon the same reasoning.

MPEP §706.07(a), entitled “Final Rejection, When Proper on Section Action,” explains that “second or any subsequent actions on the merits shall be final, except where the examiner introduces a new ground of rejection that is neither necessitated by applicant’s amendment of the claims nor based on information submitted in an information disclosure statement ....”

Because Applicants’ amendment of claims 1 and 10 was made merely for the purpose of placing claims 1 and 10 in condition for allowance consistent with the Examiner’s determination in the Office action of March 11, 2005 regarding the Allowability of claims 4 and 18, which recited the aforementioned hydrophilic treatment, the new grounds of rejection, *viz.*, the rejections under §112, were not necessitated by Applicants’ amendment and, therefore, the final rejection was premature.

Further, the rejection based upon KING was not necessitated by Applicants’ amendment and, for this additional reason, withdrawal of the final rejection as being premature is requested.

**B. Withdrawal of the Rejections Under 35 USC §112, First and Second Paragraphs**

Applicants kindly request reconsideration and withdrawal of the rejection of claims 1-3, 5-10, 12-17, and 19-30 under 35 USC §112, first paragraph, as allegedly being based upon a non-enabling disclosure.

The bases for the rejection include the following: (1) “[i]n regard to the ‘hydrophilic treatment’ it is not clear as to what the treatment encompasses;” (2) “[n]o examples of the claimed materials have been described in the specification therefore it is not clear as to exactly what materials have been disclosed and claimed”; (3) “[i]t is also not clear as to what the meted [sic] and bounds of the ‘antibacterial treatment’ encompasses, the Examiner questioning whether it is limited to just the example of silver threads; and (4) “the

process limitation of 'antibacterial treatment' does not clearly describe the 'structure of the invention.'"

Claims were rejected for non-enablement in the first Office action, dated August 25, 2004, and Applicants traversed the rejection in their reply filed on December 6, 2004 (which was then withdrawn). See pages 10-16 of that reply.

In this ground of rejection, the Examiner has taken the position that certain ones of Applicants' claims include limitations that are not supported by a disclosure that is adequate for one of ordinary skill to make and use the invention.

MPEP §2164.04, entitled "Burden on the Examiner Under the Enablement Requirement," quotes from *In re Marzocchi*, 439 F.2d 220, 223, 169 USPQ 367, 370 (CCPA 1971), in explaining that:

A specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented *must* be taken as being in compliance with the enablement requirement of 35 U.S.C. 112, first paragraph, unless there is a reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support. (Emphasis in original.)

Accord, *In re Wright*, 999 F.2d 1557, 27 USPQ2d 1510 (Fed. Cir. Further, as explained by the court , and quoted in the aforementioned MPEP section:

it is incumbent upon the Patent Office, whenever a rejection on this basis is made, to explain *why* it doubts the truth or accuracy of any statement in a supporting disclosure and to back up assertions of its own with acceptable evidence or reasoning which is inconsistent with the contested statement.

No such explanation regarding doubting the truth or accuracy of any disclosure of Applicants has been made in the Office action and, accordingly, Applicants submit that the rejection fails to meet the burden for making a rejection for non-enablement and, for this reason, withdrawal of the rejection is requested.

Likewise, as stated in *In re Angstadt and Griffin*, 537 F.2d 498, 504, 190 USPQ 214, 219 (CCPA 1976):

the PTO has the burden of giving reasons, supported by the record as a whole, why the specification is not enabling. *In re Armbruster*, 512 F.2d 676, 185 USPQ 152 (Cust. & Pat. App. 1975). Showing that the disclosure entails undue experimentation is part of the PTO's initial burden under *Armbruster* . . . .

*Accord, In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In this regard as well, no showing is made in the Office action as to why undue experimentation would be needed to enable the claimed invention. Accordingly, withdrawal of the rejection is requested for this additional reason.

Further, the first paragraph of 35 USC §112 requires that an applicant's/patentee's disclosure must enable a person skilled in the art to make and use the claimed invention. "Patents \*\*\* are written to enable those skilled in the art to practice the invention." *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1556, 220 USPQ 303, 315 (Fed. Cir. 1983, *cert. denied*, 469 U.S. 851 (1984)).

Regarding this latter point, the instant application is not directed to new materials or new fibers, *per se*, or to hydrophilic or antibacterial treatments, *per se*. The invention encompasses the implementation of materials, fibers, and/or treatments in a unique combination/arrangement in a single garment. The disclosure of materials, fibers and/or treatments that are specified in certain claims are known to those skilled in the art of garments and, to this extent, the citation of same in the claims is commensurate in scope with the disclosure. Examples of such materials, fibers, and treatments were made of record in Applicants' aforementioned reply filed on December 6, 2004.

Therefore, for that reason and for the reason that the Office action lacks a showing regarding why undue experimentation would be required for making or using the claimed invention, the Office action fails to present a *prima facie* case of non-enablement. Accordingly, Applicants request that the rejection be reconsidered and withdrawn.

Nevertheless, Applicants will next respond to certain issues raised by the Examiner in the rejection.

## **1. Hydrophilic Treatment**

The Examiner's concern regarding the hydrophilic treatment limitations are stated as follows:

In regard to the "hydrophilic treatment" it is not clear as to what the treatment encompasses. It is not clear as to whether the treatment is applied to the yarn surfaces, if the yarn is entirely comprised of a hydrophilic material or as to whether the surface of the material itself, whether inner or outer surface, is treated. Also, the product-by-process limitation does not clearly describe what the exact structural limitations of the invention in that the process can be performed by a combination of hydrophilic/hydrophobic material or by a hydrophobic material itself like (PTFE) polytetrafluoroethylene. Paragraph 26 of the specification states that the material that performs the function of transferring moisture is generally a "hydrophilic treatment" and can also be performed by a hydrophilic material such as PTFE. No examples of the claimed materials have been described in the specification therefore it is not clear as to exactly what materials have been disclosed and claimed.

As explained in MPEP §2164, the enablement requirement is measured from the perspective of those skilled in the art to which the invention is directed. As further explained in §2164.01, the §112 statute "has been interpreted to require that the claimed invention be enabled so that any person skilled in the art can make and use the claimed invention without undue experimentation."

In the instant case, in Applicants' paragraph 0026 of the specification, it is explained that a hydrophilic treatment can be used on a material to transfer moisture therethrough. Paragraph 0031 identifies a particular fabric that is 86% polyester and 14% elasthane. Paragraph 0041 identifies a material that can be 100% polyester. Attachment B (13 pages) of Applicants' reply of December 6, 2004 demonstrated that it is known that polyester is a naturally *hydrophobic* material, but that it can be treated for taking on *hydrophilic* properties.

For example, the top of the first of the 13 pages of Attachment B begins a detailed description of a hydrophilic treatment known in the art (by Takamatsu Oil & Fat Co., Ltd.), entitled "Durable hydrophilic SR agent Softener SR (for polyester)." As mentioned in the

first two “bullets” beneath the title, the Softener SR produces hydrophilic properties in naturally hydrophobic fiber such as polyester knits, weaves, yarns and nonwovens.

On page 10 of the 13 pages of Attachment B, it is explained that “[a]s polyester is a hydrophobic fiber with around 0.4% moisture absorbency, it requires hydrophilic treatment for use mainly in sportswear.”

Similarly, on page 39 of the publication (bilingual, French/English) entitled *TechStyle, the Guide to Activewear Fibres and Fabrics*, to which Applicants referred in their reply of December 6, 2004, page 39 being attached here, it can be seen that polyester is listed as having a low (1%) water absorption property.

Further, in the glossary on page 100 of the *TechStyle* guide, a copy of which is attached, for the term “Hydrophobic” it is explained that polyester by nature is hydrophobic (*i.e.*, translated from the French text “polyester sont hydrophobes par nature”).

In addition, attached is a copy of a 10-page extract of internet pages taken from [www.FabricLink.com/characteristics/html](http://www.FabricLink.com/characteristics/html), the first page of which is entitled “Clothing Materials.” At the top of the second of the 10 pages is a reference to a “Nov. ‘96” document that “evaluated 12 underlayer shirts for keeping you comfortable wicking away sweat to the exterior surface of the fabric.” Such evaluation is summarized as “Polyester has been treated (hydrophilic chemical) and altered (electrostatic evaporation process, differing inner/outer surfaces) to enhance its wicking ability.” The remainder of the extract includes a further description of hydrophilic properties, such as on pages 6-7.

The above-mentioned documents/references show instances in which hydrophilic treatment of a material is known, *per se*, particularly to those skilled in the art. Therefore, Applicants submit, undue experimentation would certainly not be required to make and use the invention by which a material is recited as having had a hydrophilic treatment.

## **2. Examples of the Claimed Materials**

Applicants respectfully submit that, contrary to the assertion in the rejection, Applicants have in fact described in their specification examples of the claimed materials.

See, for example, the materials recited in paragraphs 0026, 0031, 0037, and 0040.

In paragraph 0026, Applicants explain that “the section 21, 11 is made of a woven material that is more resistant to abrasion and is additionally treated so as to transfer moisture from the inner surface of the section to the outer surface thereof. Such a treatment is generally referred to as a hydrophilic treatment.”

Paragraph 0031 specifies that “[a]s an example, the fabric 11, 21 (see Figs. 1, 2) can be a fabric made of 86% of polyester (PES) and 14% of elasthane, with a density of 140 g/m<sup>2</sup>.”

Paragraph 0040 specifies that “[t]his material [i.e., front panel 10, top of the sleeves 30, and possibly the lateral portions 15, as mentioned in paragraph 0039 and shown in Figs. 1, 2] will preferably be a jersey that is therefore extensible and which follows the movements of the body, without requiring elasthane threads, of the 100% PES type with a density of 135 g/m<sup>2</sup>.”

Paragraph 0037 specifies, for the material of section 41 (see Figs. 1, 2), a material sold under the trademark X-STATIC® can be used. In Applicants’ reply filed December 6, 2004, a copy of page 97 of the aforementioned *TechStyle* guide was provided, as Attachment C, which provides a detailed description of the composition and properties of X-STATIC®.

### **3. Metes and Bounds of the Antibacterial Treatment**

In the §112 rejections, the Examiner claims that the metes and bounds of the “antibacterial treatment,” which is recited in claims 6, 20, and 24, for example, are not clear.

Applicants respectfully submit that the metes and bounds of the limitation referring to antibacterial treatment can be determined for compliance with 35 USC §112. Again, as mentioned above, compliance with §112 is measured from the perspective of those who are skilled in the art of the invention.

In paragraph 0036, Applicants’ specification describes the material 41 of the garment (See Figs. 1, 2) as having undergone an antibacterial treatment and/or is provided with silver threads. Paragraph 0037 gives an example of such material as X-STATIC®.

Claims 6, 20, and 24, however, are not limited to silver threads and, therefore, the “metes and bounds” of these claims encompass a mere antibacterial treatment that is not necessarily comprised of silver threads. On the other hand, those skilled in the art recognize that the implementation of silver threads has been regarded as an advancement over the use of a chemical treatment, as explained on the attached copy of page 37 of the aforementioned *TechStyle* guide. In the first sentence on page 37 explains, “[t]he first generation of bacteria-inhibiting fibers had by and large used chemicals such as Triclosean to reduce body odors (Rhovyl’As, Amicor, Silfresh, for example), but new products are switching to silver, a precious and reassuring aseptic metal.”

Accordingly, page 37 of the *TechStyle* guide evidences that those skilled in the art would understand Applicants' claims 6, 20, and 24 to encompass the previously known antibacterial chemical treatments as well as that which rely upon silver threads.

#### **4. Process Limitations**

Applicants respectfully disagree with the assertion that "the process limitation of 'antibacterial treatment' does not clearly describe the 'structure of the invention.'"

MPEP §2173.01, entitled "Claim Terminology," provides that

A fundamental principle contained in 35 U.S.C. 112, second paragraph is that applicants are their own lexicographers. \* \* \* Applicant may use functional language, alternative expressions, negative limitations, or any style of expression or format of claim which makes clear the boundaries of the subject matter for which protection is sought. As noted by the court in *In re Swinehart*, 439 F.2d 210, 160 USPQ 226 (CCPA 1971), a claim may not be rejected solely because of the type of language used to define the subject matter for which patent protection is sought.

In view of the foregoing guideline and precedent, Applicants submit that a rejection made on the basis of a limitation being a "process limitation" is in error.

#### **C. Withdrawal of Rejection Based Upon KING**

Applicants request reconsideration and withdrawal of the rejection of claims 1-3, 5, 6, 8-10, 12-17, and 19-30 under 35 USC §102(b) as being anticipated by KING.

First, independent claim 22 is directed to a garment that includes, *inter alia*, "sleeves extending from said body portion adapted to cover at least a portion of the wearer's arms, said sleeves comprising at least respective portions made of a third material different from said first material." These limitations are not addressed in the rejection. Independent claim 10 includes a similar limitation, at least similar for the purpose of this issue. Both claims 10 and 22 further make clear that said third material is different from the abrasion-resistant material of the body portion of the garment.

Applicants' claim 22 fails to read on anything disclosed by KING, inasmuch as KING fails to disclose sleeves made of a third material different from the first material and, at least for this reason, withdrawal of the rejection based upon anticipation over KING is requested.



In KING, the front and rear sides of the sleeves are made of the same materials from which the front and rear of the torso portion of the jacket 100 (Figs. 4-6) are made. See, e.g., column 6, lines 34-36, which explains that each front and rear panel 104 and 106 of the sleeves 102 is constructed from three layers of material shown in Figs. 10 and 11, with Figs. 10 and 11 illustrating the same material from which the front and rear of the jacket (122, 124) are made.

Further, because of this, the sleeves of KING are not made of a material different from the abrasion-resistant material of the laminate of Figs. 10 and 11.

Further, there is no evidence in KING nor in the Office action to explain why one would have been motivated to have modified the disclosure of KING in a way that would have resulted in the invention of Applicants' claim 22, whereby sleeves would be made of a third material, said third material being different from the material from which the a majority of the back and shoulder section are made. Accordingly, a rejection for obviousness over KING would appear to be inappropriate as well.

Second, independent claim 1 recites "a section *made of* a material resistant to abrasion ...." Claim 29, which depends from claim 1, further specifies that said material comprises polyester fibers.

By specifying that the section of claim 1 is *made of a* material resistant to abrasion, Applicants submit, the section is made of a *single* layer. In this regard, Applicants submit that a description of a garment section as being *made of a* specified material, particularly in the context of Applicants' disclosure, differs from a description of a garment section that *comprises* a specified material. The latter description is open-ended regarding the material(s) of which the garment section is made; the former is not. In this context, "a" means "single."

In contrast with Applicants' claim 1, the material from which the sections 122, 124 and sleeves 102 of KING's jacket 100 *are made* is a three-part laminate, i.e., three materials, which include a PTFE membrane 66, an outer shell 62 and an inner shell 64 (for front panels 122 and front sleeve panels 104), and membrane 66a, outer shell 62a and inner shell 64a (for rear panels 124 and rear sleeve panels 106).

In column 8, lines 19-33 identify the three layers of the jacket 100 as being three *materials*, which together form a laminate. In column 8, lines 19-21, the front panels 122a, 122b are said to include an “outer shell 62 made from any suitable fabric *material*”; in column 8, lines 24-25, the rear panels 124a, 124b are said to include an “inner liner 64 made of any suitable fabric *material*”; and in column 8, lines 30-32, the membrane 66 is said to be “made from” an expanded PTFE *material*. Thus, whereas Applicants’ claim 1 specifies that a section of the garment is made from “a material,” KING’s garment sections are made up of *three* materials.

Accordingly, at least for this reason, reconsideration and withdrawal of the rejection is requested.

In passing, Applicants note that their claims 5-7 refer to an “axillary” zone (*i.e.*, under the arm pits) and not an “auxiliary” zone, as mentioned at the bottom of page 3 of the Office action.

#### **D. New Claims**

In the amendment above, Applicants have rewritten allowable claim 7 in independent form, and they have added new claims 31-33.

Claims 31-33, which depend from independent claims 1, 10, and 22, respectively, are directed to subject matter mentioned in paragraph 0024 of the specification. As shown in Applicants’ Figs. 1 and 2, the material of sections 21, 11 extend over the top of the shoulders without there being a stitched seam, so as not to create an uncomfortable zone on which the straps of a backpack might press, for example.

By contrast, in KING, there is a distinct seam that runs along the top of the shoulders.

#### **SUMMARY AND CONCLUSION**

The grounds of rejection advanced in the Office action have been addressed and are believed to be overcome. Accordingly, reconsideration and allowance are respectfully requested.

The Commissioner is authorized to charge any fee required for acceptance of this reply as timely and complete to Deposit Account No. 19-0089.

Further, although no extension of time is believed to be necessary at this time, if it were to be found that an extension of time were necessary to render this reply timely and/or complete, Applicants request an extension of time under 37 CFR §1.136(a) in the necessary increment(s) of month(s) to render this reply timely and/or complete and the Commissioner is authorized to charge any necessary extension of time fee under 37 CFR §1.17 to Deposit Account No. 19-0089.

Any comments or questions concerning this application can be directed to the undersigned at the telephone or fax number given below.

Respectfully submitted,  
Aur lie CHAIX et al.

A handwritten signature in black ink, appearing to read "James L. Rowland", written over a horizontal line.

James L. Rowland  
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Attachments: Copies of pages 37, 39, and 100 of *TechStyle* Fabric Guide 2004  
Copy of 10-page extract from [www.FabricLink.com/characteristics/html](http://www.FabricLink.com/characteristics/html)

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# Biotextiles switch to silver

One after another, bacteria-inhibiting fibers have traded their chemical ingredients for silver and in the process they have acquired a more reassuring image.

*then any chemical antibacterial agent,"* indicates Tim Skedzuhn, at Noble Fibers. X-Static users tend to emphasize silver's myriad advantages: *"it reduces odors, is antistatic and thermodynamic. The metal is a good conductor, it keeps warmth inside the garment,"* according to Mark Pilgrim at Penn Nyla. The British knitter believes it offers the largest range of X-Static fabrics in Europe. Swiss company Eschler is also a staunch supporter. In addition to its technical properties, Christian Eschler emphasizes that *"the silver concept is reassuring, athletes are very sensitive to that."* For Tim Skedzuhn, the fiber's success is based on the fact that *"consumers look for natural methods of bacteria reduction and enhanced well-being."*

To emphasize the advantages of its own silver-based textile, Silvertex, Italian company Silres inventories its many functions: *"it is naturally bactericide, antifungal, and antistatic. It prevents odors, reduces stress, presents good therapeutic and thermal conductivity, is thermoregulating (warm in winter, cool in summer), protects against electromagnetic waves (signal reduction) and infrared rays."* What else do you want?

The only blemish in this picture, is the high cost of silver which curbs its use. Triclosan, used in the traditional Sanitized finish, is still widespread according to Roland Righetti: *"it's a safe product and it's a lot less expensive."* Triclosan still accounts for 90% of Sanitized's sales.

Yet, the noble metal's appeal and reassuring image works at several levels. Having so many diverse properties, it is almost unnecessary to mention its more down-to-earth functions. *"From a marketing standpoint, the antibacterial function is difficult to promote. Consumers may feel the need for it, but it is not easy to make this property very glamorous,"* stresses Mark Pilgrim. In the end, when listing X-Static's many advantages, Penn Nyla generally cites the bacteria-inhibiting quality last! ■ SB

**T**he first generation of bacteria-inhibiting fibers had by and large used chemicals such as Triclosan to reduce body odors (Rhovyl'As, Amicor, Silfresh, for example), but new products are switching to silver, a precious and reassuring aseptic metal. X-Static has longed used the substance. The fiber produced by Noble contains 15% silver (no relationship to the European Nobel). Initially developed for medical end-uses, it is now moving into sportswear.

Recently both Meryl Skinlife (polyamide) and Trevira Bioactive (polyester) have changed formula in favor of an alloy made of silver ions and ceramic particles. In 2002, Sanitized also launched a silver version of its antimicrobial finish. *"The technological breakthrough is that silver, when combined with ceramic, can be incorporated directly into polyamide or polyester during spinning,"* says Roland Righetti, Sanitized Product Manager at Clariant. *"Unlike Triclosan, this new finish can resist high temperatures."*

## Why silver?

*"Silver disrupts the cell DNA and prevents it from reproducing. X-Static is effective on over 400 different types of bacteria. Silver is far more effective*

**"Consumers are looking for natural methods of bacteria reduction and enhanced well-being."**

# Comparing natural and synthetic fibers

The technical features of man-made fibers are well documented yet natural fibers can also offer functional performances. The current comeback of natural fibers is an opportunity to emphasize the specific properties of the major fiber groups.

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WOOL	LINEN	COTTON	SILK	LYOCELL	POLYAMIDE	POLYESTER	
15 - 40 µ 10 - 70 mm	2.5 - 30 µ 10 - 40 mm 2.5 - 180 Nm	13.5 µ 20 - 40 mm 15 - 25 dtex	12 µ 1000 - 1600 m 20 - 22 den	-- 34 - 38 mm 0.9 - 6.7 dtex	10 µ -- 0.7+ dtex	10 µ -- 0.3+ dtex	COUNT
1.34	1.49	1.52	1.34	1.52	1.14	1.40	DENSITY (g/cm³)
10 - 50%	20%	4 - 15%	15 - 19%	15 - 17%	Depends on texturization	Depends on texturization	ELONGATION
4 - 18%	200 - 300%	20 - 65%	10 - 30%	65%	4%	1%	WATER ABSORPTION
Low	Low	Low	High	Low	High	High	WICKING
Long	Long	Long	Quick	Medium	Fast	Fast	DRYING TIME
High	Medium	Medium	High	Medium	Medium	High	THERMAL INSULATION
110	3 to 7	18-35	4.0	dry: 34-36	5.5	6.0	TENACITY (g/tex)
100°C	190°C	90°C	Hand wash cold water	40 - 60°C	40°C	40°C	WASH & CARE
After shearing, fleece is washed in a hot alkali solution. After scouring, the wool is carded and spun into yarns.	There is an annual plant, whose only stem contains fibers that can be used for textile. After a series of operations...	The white and downy hairs that grow out of the seeds of the gossypium bush are what constitute cotton fibers.	The yarn obtained after emptying the silkworm (bombyx mori) cocoon is made up of two proteins (fibroin and sericin).	Lyocell is derived from cellulose drawn from trees through the regeneration of the cellulose after dissolution in a solvent.	First invented in 1938 by DuPont, polyamide (or nylon) is drawn from hydrocarbons derived from coal, petrol or natural gas.	Made from petrol, polyester was invented in Europe after WWII in response to the American's invention of nylon.	ORIGINS
High mechanical strength, light weight, elasticity, low water absorption, flame resistance, and good thermal insulation.	It is the natural fiber offering the highest resistance and highest degree of water retention, which gives it its refreshing technology. It is also hypo-allergenic and environment friendly.	Soft, refreshing and comfortable, cotton is also durable. It can undergo many finishes (water-proofing, mercerizing, shrink control, easy care, stain release, anti-irritation, etc.) and can be blended with virtually any other fiber.	A luxury fiber, silk is all at once ultra-fine, highly resistant, soft and hypoallergenic. It also offers high suppleness, drapability and an incomparable brilliance.	Offering a relatively high tenacity when dry and very durable, lyocell is also very fluid and weighty as well as comfortable. Depending on blends and finishes, its hand varies from ultra soft and soapy to velvety and lush.	Polyamide combines lightness with high resistance to wear and tear. It is also breathable, non-wrinkle and insulating. Polyamide is extremely versatile. By varying cross-sections, brilliant or glistening yarns can be produced.	High mechanical resistance, thermoplastic, high resistance to light, heat-printable (transfer printing).	MAIN CHARACTERISTICS
Wool has been a favorite material for centuries. It is a natural fiber, which is soft and warm. It is also a good insulator and is resistant to fire.	It is a technical fiber, which has been developed for many years. It is a natural fiber, which is soft and warm. It is also a good insulator and is resistant to fire.	Through selection, it has been possible to obtain plants that consume less water. Research has led to the development of wrinkle-resistant cotton fabrics. Cotton has also explored various capabilities of wicking away humidity.	The fibers future is in transgenic varieties, including the development of highly elastic and resistant spider silk. Silk fabrics can now increasingly sustain machine washing.	The recently developed low-fibrillating lyocell fibers simplify and reduce the cost of finishing. In addition, lyocell production respects the environment and the fiber is 100% biodegradable.	Polyamide now takes on the hand and aspect of natural fibers without compromising its inherent properties. To respond to new market demands, producers have developed UV-blocking and bacteriostatic versions.	Highly versatile and widely produced, polyester end-uses are growing in technical and semi-technical applications. Research continues in the area of microfilaments, modified cross-sections and cationic polymers.	RECENT DEVELOPMENTS

Our thanks to the following companies for the information they provided: CIRAD (cotton program), l'Association Internationale de la Soie, Masters of Linen, Lenzing Fibres, Nylstar and Setila.

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est déposée sur l'une ou les deux faces d'un tissu. L'enduction peut être appliquée par calandrage, lame ou immersion. On utilise des enductions en polyuréthane microporeux pour obtenir un tissu imperméable et respirant (voir imper-respirant). Une enduction peut être employée tout simplement pour conférer un certain toucher au tissu fini.

**ENNOBLISSEMENT** - Finishing: L'ensemble des traitements de finissage (blanchiment, teinture, impression, plissage, apprêt) appliqués à une étoffe.

**ENTRETIEN** - Care: Consignes de nettoyage d'un vêtement ou d'un tissu représentées par des symboles internationaux.

**ENZYME (FINISSAGE)** - Enzyme wash: Procédé de finissage où la cellulose d'un tissu est partiellement attaquée par des enzymes pour obtenir un effet usé ou déjà porté et un toucher très doux. Proche du stone-washing, mais moins agressif pour le tissu. S'applique sur denim, tissus en coton ou en lyocell. Se dit aussi "bio-wash".

**EPONGE** - Terry cloth: Tissu maille à bouclettes non grattées.

**FAMILLE CHIMIQUE** - Chemical group: Nature chimique d'une fibre synthétique.

**FAUSSE TORSION** - False twist: Méthode de texturation employée pour augmenter le volume ou l'extensibilité d'un fil continu (acétate, polyester, polyamide).

**FAUSSE TORSION FIXÉE (FTF)** : Texturation de fil, le plus souvent synthétique, obtenue par le procédé de fausse torsion en trois étapes : torsion, fixage, détorsion. Confère aux fils un volume comparable aux fibres naturelles.

**FIBRANNE** - Spun viscose: Fibre cellulosique artificielle coupée. Depuis 1976, théoriquement, le terme n'est plus utilisé en France.

**FIBRE** - Fiber: Toute matière peut être filée. Réservé auparavant aux matières naturelles (laine, coton), ce terme est utilisé pour les filaments continus coupés afin d'être filés.

**FIL CONTINU** - Continuous filament yarn : Fil non coupé. Concerné les fibres artificielles (viscose et acétate), les fibres synthétiques (polyester, polyamide) et la soie qui naissent sous forme de filaments continus très longs.

**FILAMENT** : Fil unitaire d'une longueur non déterminée.

**FILÉ DE FIBRE** - Spun yarn: Filaments discontinus naturels, comme le coton ou la laine, ou filaments synthétiques, coupés à des longueurs déterminées pour être filés.

**FILET (MAILLE)** - Mesh: Etoffe tricotée à jours de manière plus ou moins ouverte.

**FILIÈRE** - Spinneret: Disque composé de minuscules trous (40 généralement) qui forment les filaments synthétiques et déterminent leur taille et leur section.

**FINISSAGE** - Finish: Traitements divers appliqués à un textile pour le fixer ou lui conférer différentes textures ou qualités.

**FLOCAGE** - Flocking: Finition à chaud qui imprime des motifs velours sur un textile.

**FLUORESCENCE** : Faculté d'un matériau de "s'éclairer" en présence des rayons ultraviolets de la lumière solaire. Emet une luminosité au lever du jour et par mauvaises conditions atmosphériques mais en aucun cas la nuit.

**FOAM BACK** : Contrecollage de mousse sur l'envers d'une matière. Permet de faire des doubles-faces rebondis.

**GREFFAGE** - Grafting: Traitement physico-chimique consistant à fixer une molécule sur la chaîne moléculaire principale d'un fil synthétique ou naturel afin d'intégrer de nouvelles fonctions d'hydrophobie, d'antisepsie, de filtration, d'affinité tinctoriale, etc. Tenue au lavage permanente.

**GUIPAGE** - Core spinning: Technique de recouvrement d'un fil d'âme avec un autre à l'extérieur. Utilisée pour protéger un fil extensible ou qui ne doit pas toucher la peau (fil métal), le but recherché étant de combiner les propriétés de deux fils.

**HOLOGRAPHIE** - Holography: Méthode de photographie permettant, grâce à un rayonnement (laser ou visible), de restituer le relief d'un objet en trois dimensions.

**HYDROFUGE** - Water repellent: Caractéristique d'une matière qui repousse l'eau ou l'humidité sans l'absorber.

**HYDROPHILE** - Hydrophilic: Qui absorbe l'eau. Exemples de valeurs d'absorption connues pour un taux d'humidité de 65% à température ambiante : coton = 7%, acétate = 6,5%, viscose = 11%, laine = 15 à 16%. Les membranes et enductions hydrophiles pompent l'humidité dégagée par le corps par leur attraction hydrophile.

**HYDROPHOBE** - Hydrophobic: Qui n'absorbe pas l'eau. Le polyamide, l'acrylique et le polyester sont hydrophobes de nature.

**IGNIFUGE** - Fire-proof: Antifeu. Certaines fibres, comme la chlorofibre et la laine, sont ininflammables de nature.

**IKAT** : Technique d'impression traditionnelle réalisée par ligature des fils de chaîne ou de trame avant teinture permettant de réaliser des motifs brouillés après tissage.

**IMPERMÉABILITÉ À L'EAU** - Waterproofness: Faculté de bloquer le passage de la pluie. Les tests les plus courants pour les textiles sont le Schmerber et le Bundesmann. La mesure officielle du Schmerber est en centimètres, certains continuent néanmoins de mesurer la colonne d'eau en millimètres.

**IMPER-RESPIRANT** - Waterproof and breathable: Faculté d'une matière à bloquer le passage de la pluie tout en laissant passer les fines molécules de vapeur d'eau dégagées par le corps.

**INDÉMAILLABLE** - Locknit: Technique de tricotage à maille bloquée.

**INSERT** - Drop lining: Doublure intérieure laminée à une membrane et permettant de confectionner un vêtement imper-respirant en disposant d'une liberté de choix par le tissu extérieur.

**INTIME (MÉLANGE)** - Intimate blend: Mélange de fibres filées ensemble lors de la filature et indissociables. Exemple courant : le polycoton.

**ISOLATION THERMIQUE** - Thermal insulation: Capacité de régulation de température d'une matière. L'objectif étant de conserver un microclimat sec et chaud entre la peau et le vêtement et de prévenir ainsi le refroidissement du corps. Se mesure en Rct (résistance thermique), la résistance d'une matière à laisser s'échapper la chaleur.

**JACQUARD** : Nom de l'inventeur d'un procédé de tricotage et de tissage fantaisie. Le dessin est formé par l'entrecroisement ou le tricotage de fils de couleur ou de nature différentes.

**JAUGE** - Gauge: Mesure de finesse de tricotage exprimée en nombre d'aiguilles sur une longueur déterminée (un pouce). Plus la jauge est élevée, plus le tissu est fin.

**JERSEY** : Etoffe tricotée sans côtes, ni motifs.

**LAIZE** - Width: Largeur d'un tissu entre ses deux lisières (correspond à la largeur de la trame).

**LAMINÉ** - Lamine: Matière composite réunissant plusieurs couches contrecollées ensemble. Le laminage permet de renforcer la tenue et les performances des matériaux fragiles telles les membranes.

**LAQUÉ** - Lacquered: Traitement de finissage donnant un effet chintzé ou brillant.

**LIBÉRIENNE (FIBRE)** - Bast fiber: Fibre issue du tissu végétal se trouvant dans les tiges ou l'écorce d'une plante, comme le chanvre et le lin.

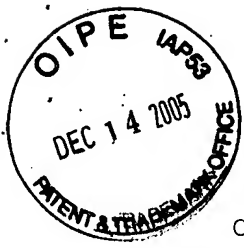
**LISIÈRE** - Selvage or selva: Bord (laize) d'une étoffe, tissé généralement de manière renforcée afin d'éviter que le tissu ne s'effiloche.

**LOBÉ, (TRILOBÉ, OCTOLOBÉ)** - Lobal (trilobal): Se dit de la section d'un fil, formée par la filière et ressemblant à un trèfle, un osselet ou une étoile.

**LYOCELL** : Nouvelle génération de fibres cellulosiques, après la viscose et le modal, produite de manière plus rapide et plus écologique. Le lyocell se distingue par sa plus haute résistance à l'état humide et sa pureté.

**MATELASSAGE** - Quilting: Technique de couture de nappes de garnissage.

**MATITÉ** - Luster: Caractère mat ou brillant d'un fil.



Clothing Materials

compiled by Ozzie Gontang <gontang@electriciti.com>

(see [www.FabricLink.com/characteristics.html](http://www.FabricLink.com/characteristics.html))

#### MICROFIBERS

Man-made: available in acrylic, nylon, polyester and rayon.

##### Characteristics:

- \* Washable, dry cleanable      Shrink-resistant
- \* High strength (except Rayon) Insulates well against wind, rain, cold

Major End Uses: sportswear, activewear, swimwear, outerwear, rainwear.

Micro-fibers is not a fiber unto itself. It is a technology developed to

produce an ultra-fine fiber, and then weave it or knit it into a very high

quality fabric constructions. DuPont introduced the first microfiber in

1989, a polyester microfiber. Today in addition to polyester microfibers,

there are also nylon microfibers that have become important in the pantyhose market, rayon microfibers, and acrylic microfibers.

An important characteristic of microfiber fabrics: they can be woven so tightly so the fabric can't be penetrated by wind, rain, or cold. For this

reason, raincoat manufacturers have become big users of polyester microfibers. Microfibers also have a wicking ability, which allows perspiration to pass through. So they're comfortable to wear.

Nov. '96 RW (pp.48-52) evaluated 12 underlayer shirts for keeping you comfortable wicking away sweat to the exterior surface of the fabric. Polyester has been treated (hydrophillic chemical) and altered (electrostatic evaporation process, differing inner/outer surfaces) to enhance its wicking ability.

Some names: Capilene, BiPolar 100 polyester, BiPolar 200 polyester, Dri-F.I.T.

Dacron is the trademark name for Dupont polyester. Woven fabric made from

dacron is similar to nylon ripstop or taffeta, but not as stretchy. Many of

the better clothing insulations are made from dacron. They are usually referred to by more specific trademark names, like quallofil, hollofil, polarguard, and dacron-88.

#### POLYOLEFIN (OLEFIN)

##### Characteristics:

- \* Lightweight, lightest fiber, it floats
- \* Strong
- \* Abrasion resistant, resilient
- \* Stain-, static-, sunlight-, and odor-resistant
- \* High insulation characteristics
- \* Resists deterioration from chemicals, mildew, sweat, rot and weather
- \* Fast drying
- \* High wickability
- \* Static and pilling can be a problem
- \* Ironing, washing/drying need to be done at low temperature



- \* Non-allergenic

Major End Uses: Apparel - activewear, sportswear, jeans, socks, underwear, lining fabrics.

Of all fibers, this is probably least familiar to you. Developed in 1961,

polyolefin has been used exclusively in the home furnishings and high performance activewear market: backpacking, canoeing, mountain climbing apparel. In 1996 producers of olefin began to make in-roads into the mainstream apparel market. It is being blended with cotton in the denim market. It's being tested in the swimwear market. Asics Japan has developed

a swimsuit made of polyolefin and Lycra for the Japanese Olympic Swim Team.

Polyolefin is the least absorbent of all the man-made fibers, and the only

fiber that floats. (Swimmers will do anything to cut a milli-second off their times!)

## NYLON

### Characteristics:

- \* Lightweight
- \* Exceptional strength
- \* Good drapeability
- \* Abrasion resistant
- \* Easy to wash
- \* Resists shrinkage and wrinkling
- \* Fast drying, low moisture absorbency
- \* Resistant to damage from oil and many chemicals
- \* Static and pilling can be a problem
- \* Poor resistance to continuous sunlight

Major End Uses:

\* Apparel - swimwear, activewear, foundation garments,  
hosiery,  
blouses, dresses, sportswear, raincoats, ski and snow  
apparel,  
windbreakers, childrenswear.  
\* Other-Luggage/back packets/life vests/umbrellas/sleeping  
bags,tents.

Nylon is one of the strongest of all fibers, and for this reason it's  
used

in garments that take a great deal of hard wear, like panty hose,  
swimwear,  
tents.

Although nylon is a very strong fiber, one of it's unfavorable  
characteristics is that it has poor resistance to prolonged exposure to  
the  
sun. In addition, the Lycra (or spandex) breaks down from exposure to  
chlorine in pool water. Lycra is used for its stretch.

Supplex has a feel of cotton, comfortable, breathable and water  
repellent/

NOT water proof). Absorbs a small amount of water if it is getting  
drenched.

WOOL            Natural, Animal fiber

Characteristics:

- |                     |                        |
|---------------------|------------------------|
| * Comfortable       | * Luxurious, soft hand |
| * Versatile         | * Lightweight          |
| * Good insulator    | * Washable             |
| * Wrinkle-resistant | * Absorbent            |

#### Major End Uses:

\* Apparel - sweaters, dresses, coats, suits, jackets, pants, skirts,

childrenswear, loungewear, blouses, shirts, hosiery, scarves.

#### GORETEX

A teflon based membrane with microscopic holes. Gortex's claim to fame is

that it will let water vapor (from perspiration) through, but not liquid

water (rain). It blocks wind fairly well too. The membrane is delicate, so

it always comes laminated between 2 layers of other material. It does not

breathe enough. There are less expensive alternatives.

#### POLYPROPYLENE/THERMAX

Does not wick very well. Can be uncomfortable. Troublesome to care for

(e.g. can pill badly) Will keep you fairly warm if soaked. Not very wind

resistant. Shrinks under heat from dryers. Thermax is an improvement on

Polypropylene. The big advantage is that Thermax is heat resistance so you

can put it in the dryer. Balance that against the extra cost.

#### 60/40 CLOTH

This is a cloth with nylon threads running one direction, cotton in the other. It was the standard wind parka material before Goretex came along,

and is considerably less expensive. Good wind resistance, fairly

breathable. Somewhat water resistant, especially if you spray it with

Scotchguard, but won't hold up to a heavy rain.

## Breathability of Materials

summarized from Clive Tully UK Outdoor/Travel Writer

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Breathability in waterproof clothing is one of the most misunderstood and

misrepresented technical aspects of outdoors clothing and equipment. It's

all very well listing the technical merits of a particular fabric, coating

or membrane. Too often, the design of the finished garment either makes or

breaks the fabric manufacturer's claim. E.g., a walking jacket with a

permanently vented shoulder flap might as well be made of non-breathable

PU. It can't maintain the partial pressure which makes the fabric work. The

exception is Gore-Tex fabric. Garment manufacturers using their fabrics

have to submit sample products for Gore to check they meet their laid down

standards of manufacture. Not many fabric manufacturers do that, but then,

not many have such a tight grip on their markets.

## The Breathable options

Breathable waterproof fabrics operate by one of two ways. They're

microporous, with microscopic pores which permit the passage of water

vapour but not water liquid, or they're hydrophilic, a solid barrier but

capable of absorbing moisture vapour and passing it through its structure.

Either may come as coatings applied directly to a fabric, or membranes

which are glued to the fabric which carries it. Then there are microfibre

fabrics and cotton fabrics.

The top end of the market is dominated by Gore-Tex, and like some of the

other laminates on offer, it comes in a variety of forms. The original, and

still the best for durability, is 3-layer, where the breathable waterproof

membrane is sandwiched between a facing and lining fabric. Garments made of

this tend to be good value, too, because the manufacturing processes aren't

so complex. 2-layer is softer, with the membrane glued to the underside of

the facing fabric, and a loose lining. Not so durable, but usually more breathable, and more expensive. Other varieties, laminate the membrane to a

lining fabric with loose outer - nice for fashion garments, and sometimes

the waterproof lining has loose outer and lining on either side - again,

more complex constructions generally adding up to more expensive garments.

And the outside pockets will let in water...

A coating is a coating, or is it? Breathable PU nylon doesn't really mean

an awful lot. Individual coatings can have their chemistry tinkered with to

make them more breathable or more waterproof. Cheaper coatings may be

applied in one pass over the fabric, more expensive performance coatings

may be made up of several thinner applications.

You'd expect breathable waterproof fabric to work reasonably well in dry

conditions, provided you're not working so hard as to overload its capability to transport moisture. The real crunch is when it's raining. How

much does it breathe after 5 hours in pouring rain? Tests showed that all

fabrics lose an element of breathability in wet conditions. The various configurations of Gore-Tex lost between 34 and 43% of their breathability,

Sympatex 31% on a Z-liner construction, 70% in a double layer. Helly-Tech's

decline was just short of 75%, but perhaps the biggest surprise was Lowe

Alpine's Triple Point Ceramic 1200, losing just 15%.

Whatever the coating or laminate, the facing fabric and its water-repellent

surface treatment is absolutely critical. It's fair to say that the coarse

texturised facing fabrics will fare less well than smooth ones because of a

larger surface area to grab water when the water repellent treatment wears

off.

Linings

It is a misconception that a lining is an aid to breathability. It isn't.

It won't make any improvement. As an extra layer of insulation, it will

make condensation inside the jacket MORE likely. What it does is improve

the comfort factor by putting a layer between you and any condensation which may form on the shiny underside of your coating or membrane. 2-layer

Gore-Tex would be just too fragile without a loose lining to protect it. In

other instances, it's used to mask what's going on (or rather, not) at the

point of greatest resistance!

A mesh lining can achieve the same effect with less resistance to the passage of water vapour - looks nice too, even if it is a bit of a pain with Velcro - but the best functional designs will still employ a smooth

lining fabric down the arms to avoid drag over your fleece. But if the mesh

is to do the same job for a poor breathable coating or membrane as a close

weave lining fabric, it has to be made from an absorbent or wicking fibre,

otherwise, there's not much point in having the lining at all.

#### Maintenance

Whether you have an expensive membrane or an inexpensive coating lurking

behind the face fabric of your jacket, the moment the fabric "wets out",

you're in danger of anything from drastically reducing performance to turning your jacket into something with the breathability of a bin liner.

It's easy to see when this happens. The water no longer beads up and rolls

off the surface of the fabric, and you'll see it soaking into the material

in patches. The fabric is still waterproof (apart from pressure points

-

see above), but its breathability will be greatly impaired. The answer is

to keep your jacket clean, following any washing instructions to the letter, and maintain the water repellent finish on the outside.